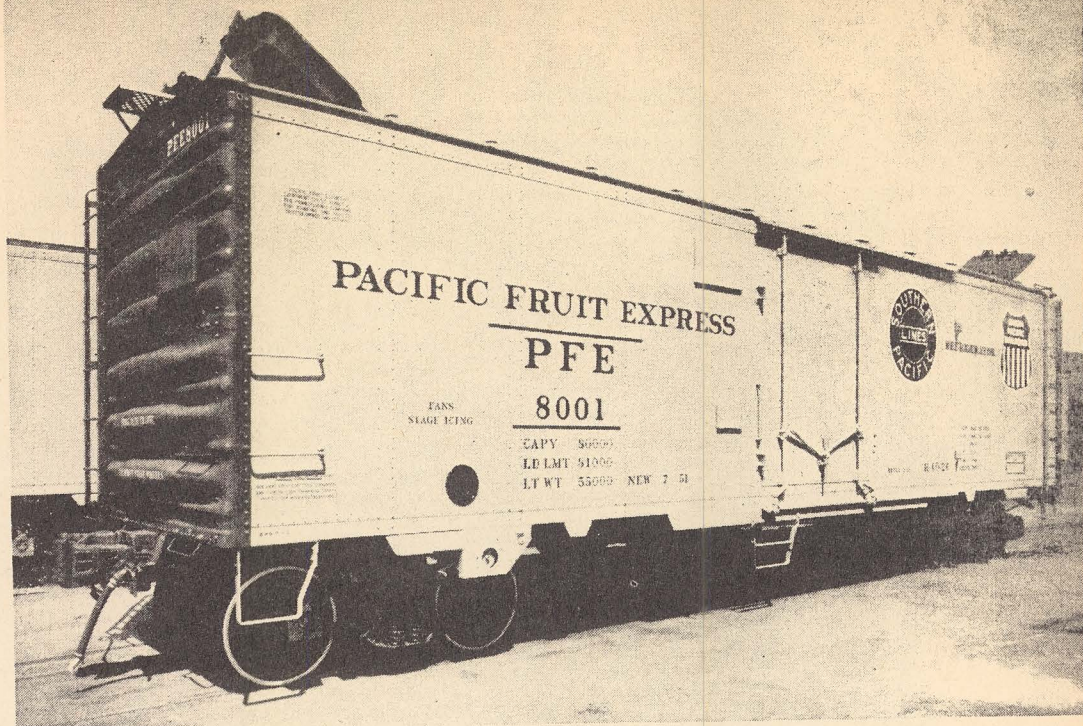


New P.F.E. refrigerator car with hatch plugs raised

Heavily insulated steel-sheathed cars have sliding doors 6 ft. wide — Floor racks are composite wood and steel — Air is circulated by electrically driven fans



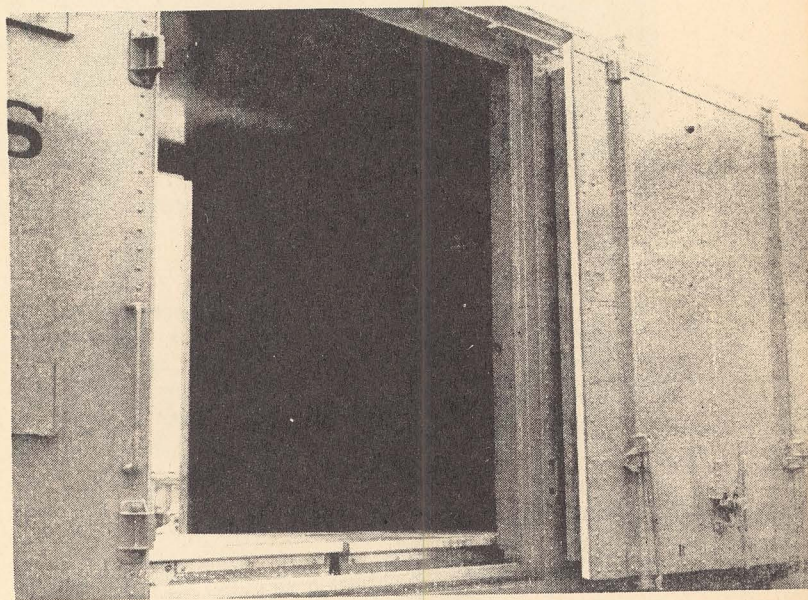
Pacific Fruit Express Builds 2,000 Refrigerator Cars

The Pacific Fruit Express Company now has under construction 2,000 steel-sheathed, wood-lined 40-ton refrigerator cars, Class R-40-26. At the end of 1951, 1,111 cars of this order had been turned out by the company's shops at Los Angeles, Cal., and Colton. When the order is completed, it will have added materially to the fleet of modern all-purpose cars operated by this company and, by replacing a considerable number of old worn-out cars, will have improved standards of service and reduced maintenance costs.

The cars are equipped for two-stage icing. They have sliding doors 6 ft. wide and composite wood and steel floor racks designed for pallet loading. Air-circulating fan equipment is of the new electric type developed by Preco, Inc., Los Angeles.

Inside dimensions of the new P.F.E. refrigerator cars are 33 ft. 2 $\frac{3}{4}$ in. long between bulkheads, by 8 ft. 3 in. wide, by 7 ft. 4 $\frac{1}{2}$ in. high above floor racks, providing a cubic capacity between bulkheads and above floor racks of 2,022 cu. ft. The capacity of both ice tanks (chunk ice) is 11,500 lb., which is reduced to 6,500 lb. for stage icing. Trucks with long-travel springs (3 11/16 in.) and built-in friction snubbers are equipped with one-wear steel wheels and weigh about 6,600 lb. per truck. The light car weight, including trucks, is approximately 54,500 lb.

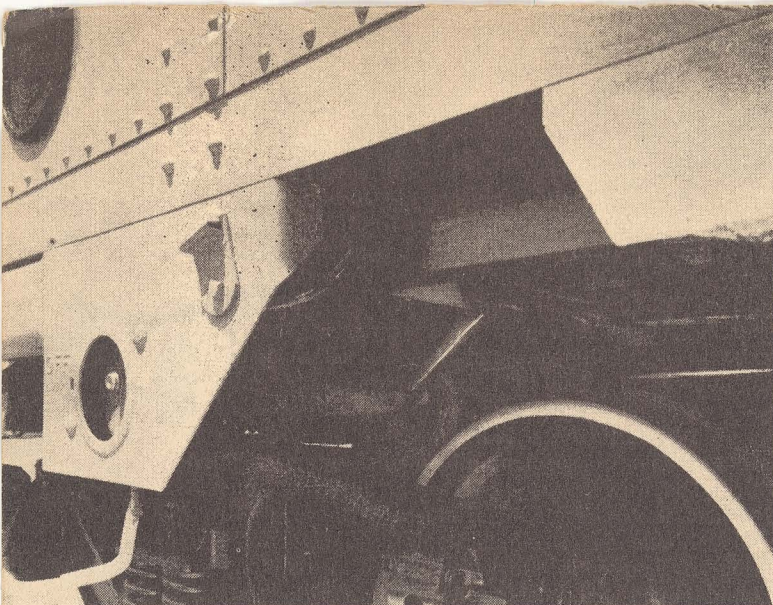
The car underframes are made of welded open-hearth steel by the Consolidated Western Steel Corporation. The superstructures are a combination of riveted and welded construction. Steel sheathing and framing were furnished by Youngstown Steel Door Company. Standard



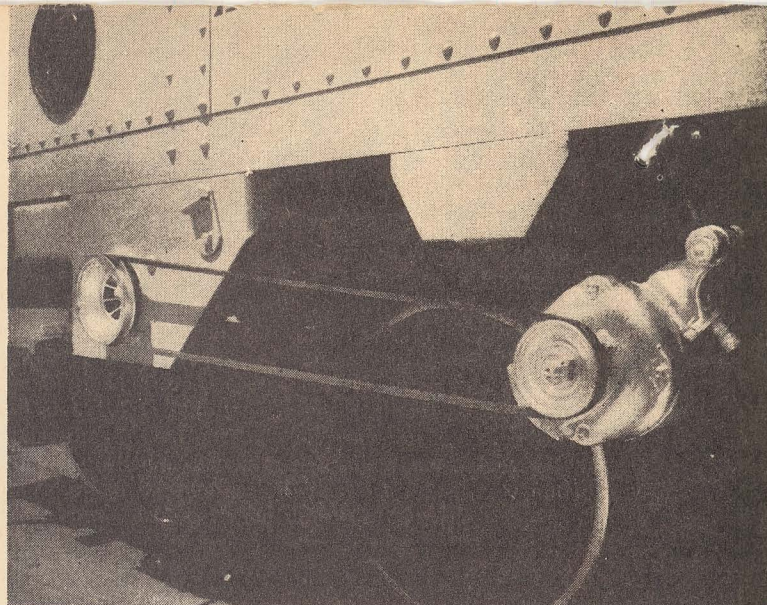
Six-foot sliding door in open position

two-piece corrugated steel ends and solid riveted steel roofs are used. The ends are strengthened with a welded reinforcing I-beam riveted to the corner posts at each end and extending across the car behind the lower main outward corrugation.

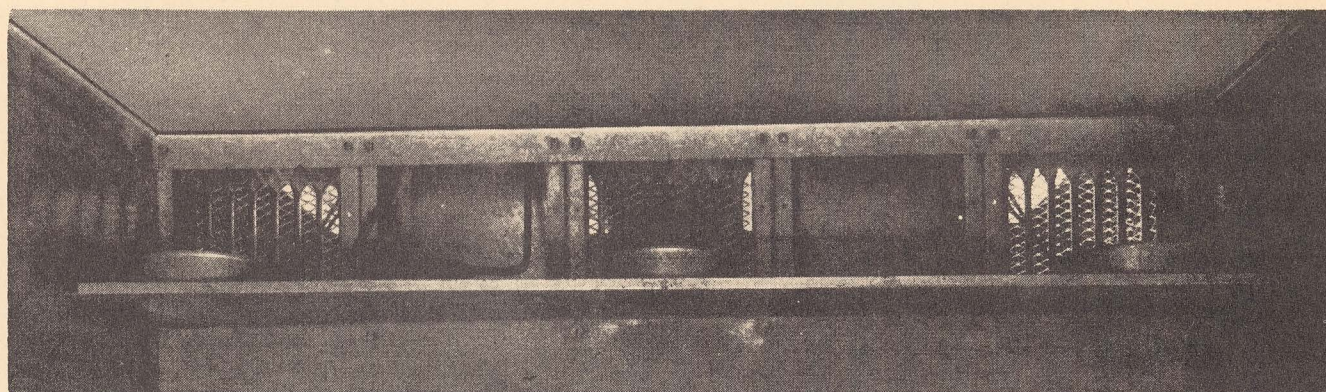
Belt rails and coping boards are Douglas fir and extend from door posts to corner posts, being bolted to the steel framing. The fir door posts are bolted to the door steel Z-bars. Inside lining consists of 9/16-in. plywood side and ceiling panels and 3/8-in. panels at the



Complete installation of alternator with rubber-tread drive wheel, bearing on a car wheel



Alternator assembly in "off" position and an electric pre-cooling motor in place ready for operation



For inspection and servicing the hinged fan panel is supported in its lowered position by safety chains

ends. The subfloor consists of wood subsills bolted to the underframe and covered with $\frac{3}{4}$ -in. by $3\frac{3}{8}$ -in. straight-edge boards. Intermediate and center floor stringers are toe-nailed to the subfloor and a $1\frac{3}{4}$ -in. by $5\frac{1}{16}$ -in. tongue-and-groove upper floor applied.

Running boards and brake steps are Association of American Railroads approved metal type.

Insulation

The floor insulation consists of one lower course of $2\frac{1}{2}$ -in. fibrous-type insulation and one top course of 2-in. plastic multi-air-layer insulation. The car floor is made watertight in the usual manner with asphalt waterproofing materials and the floor pan is set in caulking compound at the front edge and side openings. Floor racks are of the herringbone type with galvanized metal slats on Douglas fir stringers, designed for lift truck operation. They can stand a 1,800-lb. concentrated load without exceeding the metal yield point. These racks are hinged to the car sides with cast-steel hinges.

After assembly, the inside surfaces of steel sheathing, steel ends and side plates are sprayed with $\frac{3}{16}$ in. of corrosion-preventive insulating material. Wall insulation consists of two 2-in. thick blankets, the outside course being applied in one piece from door post to corner post and between the corner posts. The inside blanket, however, extends from door post to door post around the end of the car in a single piece. One layer of approved reflective type insulation is applied in side and

end walls, adjacent to the steel sheathing and steel ends, the single reflective surface in each instance facing either the wall air space or outside of the car.

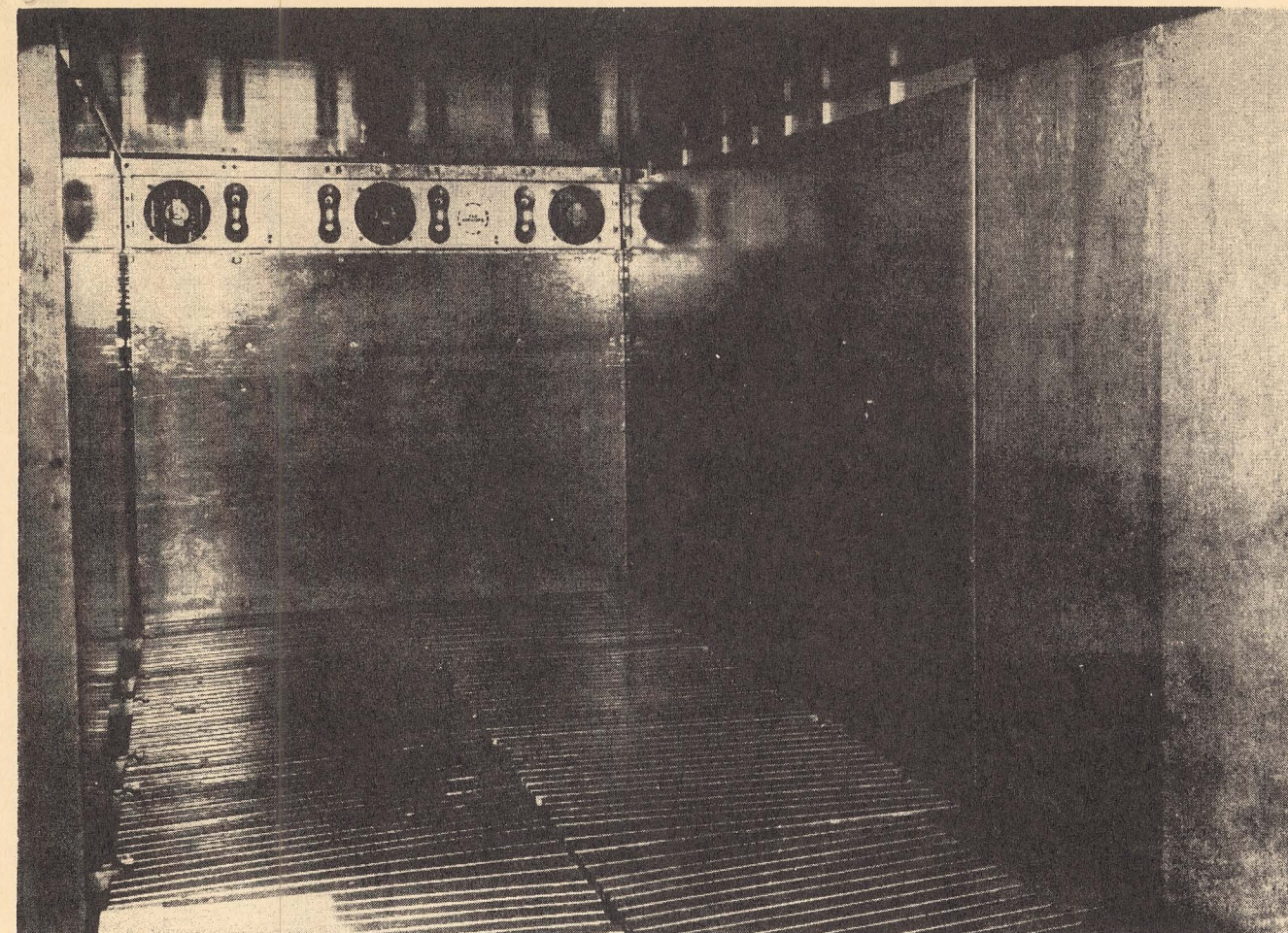
Roof insulation consists of one top course of reflective material (bright surface up), two intermediate courses of 2-in. blanket insulation, and one bottom course of $\frac{1}{2}$ -in. board insulation. Hatch plugs have the same kind and thickness of insulation as specified for the car roofs.

The 6-ft. sliding side doors utilize the same general type of construction and insulation as the side walls. They are made of jigs and templates for interchangeability and each door is carefully fitted to the openings to prevent air leakage. Door fasteners are adjusted so that, when operated, doors are forced tightly closed. A fixture near the lower edge of each door engages a fixture on the car side to hold doors in the open position.

All of the truck axles have 5-in. by 9-in. journals. Four types of trucks are employed. These are the American Steel Foundries A3 Ride-Control, the Standard Car Truck S-2-C stabilized, the National Malleable & Steel Castings C-1 Control, and the Buckeye Steel Castings Cushion-Ride. All are equipped with A.A.R. No. 18 brake beams. The cars have AB air brakes. Hand brakes are the A.A.R. certified non-spin type.

Air-Circulating Fans

The Preco Type AA electric fan system consists of one alternator with electric connections to three motor-driven fans mounted at the top of each bulkhead and blowing



The inside finish, metal slat floor racks and three-unit fan panel in the top of the bulkhead

cooled air from the ice bunkers over the top of the load instead of forcing air into the ice bunker bottoms as is the case with mechanically driven floor-type fans. For simplicity, ruggedness and minimum maintenance, a permanent-magnet, low-voltage, three-phase system is used without commutators, slip rings, brushes, or batteries. Ease of servicing is assured by supporting the fans, electric wiring and fuse block in a hinged three-unit fan panel which fits in the top of each bulkhead and may be easily rotated down to a horizontal position for inspection or repairs, as necessary.

The alternator is driven from the car wheel by the same drive wheel as used on floor-type fans. The drive wheel is directly coupled to the alternator by a shock absorbing coupling without belts.

Fans with high efficiency airfoil-type stub blades are pressed on the motor shafts. The fan speed is proportional to the car speed and fans always turn in the same direction. One car set of six fans is designed to deliver increasing amounts of free air at various speeds up to 11,000 cu. ft. per min. at 69 m.p.h. and at various pressure heads up to 1.2 in. of water.

To keep the fans rotating in the same direction, regardless of the direction of car travel, two of the three alternator phases are interchanged by an automatic reversing switch which operates within the first revolution of the alternator or drive wheel. This switch is built into the alternator. There is no other switch in the system.

Each motor is individually protected by fuses. If one of the fans is stopped by accident, all other fans will

continue to operate. In addition, the entire system is protected by fuses near the alternator. The motor fuses are rated at 5 amp. and the alternator fuses at 30 amp.

The alternator and motors, totally enclosed, are supported on rubber shock mounts. The bearings of neither require service lubrication.

Precooling

For precooling, the alternator drive wheel is lifted off the car wheel by the same mechanism as is used on floor-type fans; a precool sheave is then mounted on the alternator shaft extension, and the alternator driven by V-belt from a precool motor. Only one precool motor is used for each car. The precool sheave attached to the alternator is intentionally made different from the precool sheave used with floor-type fans and incorporates a blower to cool the alternator during stationary precooling. A 2-hp. three-phase motor with 5-in. sheave diameter is recommended for use with electric fans.

Frequency and voltage of the system vary in proportion to the car speed. At 70 m.p.h. the generator operates at 140 cycles per second and 46 volts. With six fans the current is 27 amp. at that speed and the total power output, 1.5 kw.

Curves for power, current, voltage, and fan speed plotted against car speed show favorable characteristics. Relatively high current at low car speeds is a special feature of the system and causes the fans to turn as soon as the car moves.

